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State of Maryland
Board of Natural Resources

THE MARYLAND FARM WOODLOT

Outline Course in Vocational Agriculture

ADNA R. BOND

BUREAU OF PUBLIC ADMINISTRATION
UNIVERSITY OF MARYLAND
COLLEGE PARK, MARYLAND

March, 1948
Educational Series, No. 21

Department of Research and Education
SOLOMONS ISLAND, MARYLAND

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THE MARYLAND FARM WOODLOT; AN OUTLINE COURSE IN VOCATIONAL AGRICULTURE

ADNA R. BOND
Assistant Forester

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FOREWORD

The American people have begun to recognize the need of sound management plans for the maintenance and development of the natural resources once so plentiful but now dwindling to low levels of abundance. More and more they are expressing themselves to the end of effecting a wiser use of these assets. Likewise, they recognize the need of a broader understanding of the resources and their use. The public school authorities of the State are encouraging the use of conservation materials in the class rooms and at all levels in order that there may be developed a recognition of natural resource values and an understanding of the social and economic implications involved.

An example of what could be done is found in the State's woodlands where, under sound management, the yields could be increased fully seventy-five percent, and at a time when wood products are becoming increasingly scarce and prices accordingly higher. More wood is needed. An aroused public will and must see to it that all woodlands become productive to their capacity.

This outline was prepared, under the supervision of Mr. H. C. Buckingham, Acting Director, Department of State Forests and Parks, for the purpose of bringing into focus the essential features of managing the woodlands on the average farm. It is, by no means, a complete treatise on the subject with all of the technical features. Rather, the outline is presented as a convenient means of covering this new part in land use planning, called woodland management. The student may well use this outline for a quick coverage of the subject, rather than for details on the technical phases of woodlot management. After the student has mastered the general features of woodlot management he may, if he desires, read for further information any of the references listed in the outline.

R. V. TRUITT, *Director*
Department of Research and Education

THE MARYLAND FARM WOODLOT

INTRODUCTION

The forests of Maryland cover 2,700,000 acres of land, or 42% of the land area of the State. In 1941 the products of Maryland forests were worth $8,823,000. The forest and wood using industries give employment to some 30,000 persons. A cross section of Maryland reveals three topographic areas; namely, Coastal Plain, Piedmont Plateau and Appalachian Plateau. The topography of Maryland, from East to West begins with flat lands, then rolling hills and finally the mountains in Western Maryland. This topography, together with weather and climate, has influenced, to a large degree, the broad types of forest land in the State. The three broad forest types in Maryland are, (1) Loblolly Pine in the lower Eastern Shore and the Southern Maryland flat areas; (2) Central Hardwoods on the Northern Eastern Shore and Central Maryland; and (3) Mountain Hardwoods in Frederick County and Western Maryland.

These different forest types vary in the growth and character of timber they can produce. Better soils mean better timber. Unlike most other natural resources, our forests give us added values – not possible to compute in terms of money, but essential non-the-less, in watershed protection, in prevention of soil erosion, conservation of wildlife and in opportunities for outdoor recreation. The value of our forest lands were conservatively estimated in 1941 to be worth $50,000,000. One might ask the question: Is this basic and renewable natural resource worth protecting and worth managing for future timber crops? The answer, of course, is yes. The problem is, however, how to get Maryland's forest lands to grow continuous crops of good timber. We know that of all the lumber consumed in Maryland, only 25% is home grown. We have to pay to outside interests the profit of growing the timber and the freight for transporting the lumber and other forest products, to Maryland.

Half the forestry problem in Maryland is found on the 1,400,000 acres of farm woodlands, owned by some 29,000 farmers. In general, the most productive acres of Maryland forest land are in farm ownership. Farm woodland owners, therefore, have a deep and real responsibility to see that their woodland output is almost doubled to meet the demands for wood today.

AN OUTLINE COURSE IN VOCATIONAL AGRICULTURE

I. Value of Farm Woodlot

A. Makes use of land unsuited for other agricultural crops.

B. Affords food and shelter for wildlife.

C. Helps protect underground water supply through absorption of rainfall and helps control soil erosion.

D. Produces lumber and other wood products for farm use.

E. Adds to the beauty of the farm landscape.

II. Suggested Practices for Use in the Farm Woodlot

A. Protection from fire, insects and diseases.

B. Improve, through cultural practices, the existing woodlot.

C. Plant trees on idle land.

D. Learn to measure forest products, both standing and cut and how to market them wisely.

III. Detailed Practices

A. Before a woodland can be managed for profit it must be given protection from destructive agencies, as any investment must be protected. Before the woodlot yields any forest products, taxes must be paid; many years will have passed and many hours of labor and use of farm equipment will have gone into assisting nature grow a crop of trees. Such investments must be protected. This is good farm business.

B. Protection from destructive agencies (In order of importance in Maryland).

1. Fire
2. Unwise cutting by man
3. Grazing
4. Insects
5. Diseases

C. Forest Fires

1. Damage from fire

a. Destroys life-giving humus and soil cover, thus exposes the soil to drying winds and reduces soil fertility.

b. Kills smaller trees (up to 4 inches) and also damages the larger trees.

c. Makes basal wounds, which are openings for insects and diseases to enter the tree.

d. Retards growth and subsequent production of wood.

2. Prevention of woods fires by farmer in his woods.

a. Be careful in the use of fire near the woods.

b. Observe Maryland's 4 o'clock brush burning regulation.[3]

c. Keep brush away from woods roads, public roads, etc.

d. Talk fire prevention among neighbors and caution them to be careful with cigarettes and burning brush — the two major causes of woods fires in Maryland.

3. Forest Fire Behavior

a. Fires burn faster uphill than down.

b. Fires burn faster and hotter where the fuel (leaves, brush, etc.) is the greatest.

c. Fires create their own drafts. Cold air comes in at the bottom of a brush fire to replace the hot air, which rises, thus creating a draft.

d. Fires are more likely to start and burn faster during the middle of the day because of:

(1) Higher temperature and lower humidity

(2) Stronger, more variable winds

e. Grass fields burn faster than woodlands because wind has ready access to them. Logs, stumps, and other larger fuel items require longer time to burn. Thus, they may smolder long after the main fire is controlled and extinguished.

4. Forest Fire Control

a. Attack all fires promptly.

b. Attack fire at the "head" (in front) where flames are the biggest and smoke the densest. This is the area spreading the fastest.

c. Divide the fire crew into two groups — one going around each side of the head.

d. Mop up, or clean up, burning and smoldering embers along edge of fire line.

e. Be sure fire is out before leaving.

f. Study Forest Fire Manual.[3]

5. Time of Year When Fires Occur

a. When forest is dry – can be any time of the year.

b. *Spring* is usually the driest, windiest period. Sixty per cent of all forest fires in Maryland burn in late March, April and May. This is the spring fire season.

c. *Mid-summer* dry periods. This is more pronounced on the lower Eastern Shore.

d. *Fall* after leaves drop. Grass fields are dry before the winter rains and snowfall. Late September, October, November and early December is the fall fire season.

6. Types of Forest Fires

a. *Surface.* Most prevalent in Maryland. Fire burns on the surface of the forest floor generally. The easiest type fire to fight.

b. *Ground.* Fire burns deep in the humus, particularly during dry summers. Burns with little or no flame. Spread is slow but persistent.

c. *Crown.* Burns in crowns or tops of pine trees and some young oak trees, which hold dead leaves all winter. Fast moving type fire.

D. Unwise Cutting by Man

Man, through overcutting, has reduced soil productivity, caused soil washing, created fire hazards, and created favorable conditions for insect and disease outbreaks. Good management is the answer. This subject is discussed later.

E. Grazing

1. Damage

a. Young natural tree growth is eliminated or destroyed; thus future timber trees are killed.

b. Stock compacts the soil, reduces its water absorption capacity, and reduces its productivity.

c. Roots and bark are trampled or rubbed off exposing trees to rot and decay.

d. Removes ground cover from forest so that the ground dries out and wildlife cover and food are destroyed.

e. Causes erosion.

2. Value of Woods Pasture

Very low. Grasses and other browsing plant life, growing in open sunlight, produce more high quality food than shaded areas in the farm woods. Livestock grow faster in open pasture than in the woods.

3. Solution

a. Fence woods to exclude cattle.

b. May leave small woods border for shade to cattle.

F. Insects

1. Types of damage

a. Defoliation – eat tree leaves

b. Wood borers – generally attack weakened trees

c. Bark Beetles – generally in weakened trees.

2. Control

a. Maintain good growing conditions and maintain variety of species

b. Spraying and pruning infested trees is generally not practical in the woods.

G. Diseases

1. General – The only serious forest tree diseases in Maryland to date are the chestnut blight and the white pine blister rust.

2. Classification of diseases and examples

a. Root diseases – the shoestring root rot on hardwoods and conifers of all ages.

b. Stem diseases – most important. White pine blister rust girdles the tree. Nectria canker on oak is a localized infection.

c. Foliage diseases – cedar rust and leaf spots on maple and other hardwoods. Destroys small areas or whole of leaf.

3. Control

a. Keep forest in good growing condition – fire and grazing out and wise cutting in. Cut and use or destroy infected trees.

IV. Management of the Farm Woods

A. General – The average farm woodlot is composed of a variety of tree species, tree forms and conditions. Each tree species has a particular value and will generally grow on selected sites, for example: Tulip Poplar is valued for its basket veneer qualities. It prefers moist, well-drained, bottom land. White Oak (the State Tree of Maryland) is preferred for its structural uses in ship timbers and buildings. It prefers the better sites. Chestnut or Rock Oak makes good railroad ties and grows well on high, dry sites. However, some species such as Red Maple, Black Gum, Hickory and Beech may grow on a variety of sites and are worth little, relatively speaking. These are the so-called "weed" species in the natural hardwood stands in Maryland.

Consult the poster "How a Tree Grows" [4] to learn the why and how behind the management of a woodlot. Different trees require different growing conditions for optimum development. The pines, poplar and red gum prefer open areas to start growth where competition is at a minimum and full access to the sun is possible. Sugar Maple, the oaks and beech can do well in the shade of other trees. All tree species prefer the cooler, generally moister, north and east slopes. The south and west slopes are generally warmer, drier and support poorer formed and slower growing trees.

B. Broad Types of Cutting in the Woods

Woodlot management and woodland improvement calls for the help of man, working with nature, to aid the desirable

trees to grow faster and to gradually reduce in numbers the inferior, or weed species, and defective trees of all species. To the average farmer this means the use of the axe and saw. The use of these so-called cultural operations will yield returns in the form of usable forest products on the farm. There are two broad types of cutting operations in the farm woods, as follows:

1. Intermediate cutting made between the formation and harvest of the wood crop. The various types of intermediate cuttings are listed below:

   a. Cleanings

      (1) Cleanings are made in very young stands to eliminate undesirable species and defective forms of all species to favor the desirable species. Generally confined to stands under four inches or sapling size. In natural hardwood stands in Maryland the inferior species are beech, black gum, hickory, and red maple and the defective trees are such as crooked, forked, limby, etc.

   b. Liberation

      (1) Liberation can be made in any age stand to free desirable crop trees from competition from undesirable trees. A group of younger, straight, thrifty trees may be "liberated" from overtopping by large, spreading and limby "wolf trees".

   c. Thinning

      (1) Thinning is made in immature stands to release crop trees from competition and increase their *growth rate*. Growth is the important item here.

   d. Improvement

      (1) Improvement is made in stands over four inches. Generally the same as cleanings. The idea is to improve the composition, form and character of the stand.

   e. Salvage

      (1) Removal of trees damaged by fire, insects, diseases, wind, etc.

f. Pruning

(1) Removal of side limbs on first eighteen foot of tree to improve quality of the butt log. Should be confined to crop trees as this operation generally does not return a cash income to the operator.

C. Types of Intermediate Cuttings

Intermediate types of cutting are summarized below:

Kind of Cutting	Time of Application	Products Removed	Remarks
Cleaning	First to approximately twentieth year	Small poles and stakes	Often unnecessary
Liberation	First to approximately twentieth year	Miscellaneous	Often unnecessary
Thinning	Early life to period of regeneration	Fuelwood, pulpwood, small saw logs, posts	Needed in fully stocked stands
Improvement	Twentieth year to period of regeneration	Fuelwood, pulpwood, small saw logs, posts	Usually required in mixed stands previously not managed
Salvage	Any time material is worth salvaging	Varies	Used to prevent injury to stand and utilize damaged timber
Pruning	First quarter or half the rotation when crop trees are selected	None	Prune only crop trees to top of first 16' log.

D. Harvest Cutting

Made when the crop is mature. There are two general types of harvest, or reproduction cutting, designed to regenerate or start a new forest:

1. Selection cutting

a. The removal of individual crop trees as compared to cutting all trees on a tract. In the selective type cutting, reproduction of new trees gets established in the opening made by the removal of the larger crop trees. The remaining trees supply the seed for starting the the new forest. This type cutting is applicable in

hardwood stands where the trees are generally more tolerant and will live in closer competition with their neighbors. Also, generally the seed of hardwood species, acorns, nuts, etc. cannot be carried far by wind, water, squirrels, etc.

2. Clear Cutting –

The removal of all trees. In hardwood stands this type of cutting is not conducive to good, healthy stands of timber because of:

a. All desirable trees needed for seed are cut.

b. Presence of too many trees of sprout origin from the old stump. These trees are short lived and generally susceptible to decay and rot from the old stump.

However, clear cutting is considered the best means of reproducing pine stands. Clear cutting, leaving seed trees,restocks clear cut areas to pine. Pine seed are light, viable, and can be blown long distances by the wind. In general, a minimum of four and preferably six seed trees per acre will satisfactorily reseed an area to pine.

E. General Cutting Instructions

1. The Management Plan is the plan of action in administering and cutting of the forest. It should include:
   a. Objective of managing the forest
   b. The overall farm plan and need for wood
   c. Survey of existing woodland
   d. Survey of land in need of planting
   e. Inventory of woodland
   f. Markets for timber

2. General

Before any cutting is permitted in the forest, a plan of cutting should be made. This is called a cutting plan and is part of the over-all management plan. The plan should run somewhat as follows:

a. Mark the trees to be cut.

b. Measure the marked trees to determine their volume and value.

c. In a harvest cutting in hardwood forests, mark for removal approximately thirty per cent of the stand

represented by trees sixteen inches "dbh" (diameter, breast height) and larger. This will permit another cut in 10-15 years. Managing the forest on this sus-yield basis insures continued crops of timber from the same land and does not open the soil to the drying effects of the sun and wind.

d. In marking the woodlot, follow the points below.

(1) Do not cut the desirable species (Tulip Poplar, Oak, etc.) smaller than sixteen inches dbh. It does not pay to cut small trees for timber. It takes twenty-one logs twelve feet long, twelve inches in diameter to make 1,000 board feet; seven, eighteen inch logs to make 1,000 board feet, and only three, twenty-five inch logs to make 1,000 board feet.

(2) Cut the inferior species, if merchantable, as means of improving the stand.

(3) Cut or girdle the dead, dying and defective trees, whether merchantable or not. It is good forestry to get these non-producers out of the woods.

(4) Try to leave potential crop trees evenly spaced or grouped to make the best use of the site and retard the establishment of weeds and other obnoxious vegetation in the forest. Remember the best forest is a cool, moist one.

V. Planting Trees on Idle Land

A. General Need for Planting in Maryland.

It is important to note at the beginning that the cheapest, most practical method of producing trees is by the proper care and protection of existing woodlands. Our native or natural stands of timber generally grow on the land suited to them, under present land use programs. If these existing stands of timber can be properly managed, they will yield the timber the nation and the owner needs. This is cheaper and yields quicker returns to the farmer than planting land to trees. It is estimated that up to 400,000

acres of land in Maryland, now idle, or producing poor crops of weeds and agricultural crops, should be growing trees. The areas on the average farm that might be planted to trees are stoney, wet, steep, old worn out fields and other areas in active soil erosion. Ordinarily, the best land is now in production, growing annual agricultural crops. The left over land and the land producing poor crops should be planted to trees.

B. What to plant

Maryland is the meeting place of Northern and Southern species. Cold-thriving trees grow in the mountains of Western Maryland, Southern pines grow in Southern Maryland and on the Eastern Shore. The Eastern Shore pine, however, does not grow in the mountains because of the difference in the length of growing seasons, temperature, soil, etc. Not every tree will grow on the average, worn out, idle land. The fact that the soil is deficient in humus and other minerals restricts to a few, the number of trees that will grow on it. In general, the pines will grow on poorer soil than the hardwoods; the pines prefer a lighter soil than the hardwoods. What to plant, therefore, depends very much on the land, its condition, slope,[5] etc.

C. Why Plant Trees?

1. Put idle land under cover
2. Make wildlife cover
3. Grow forest products for the farm, such as posts, firewood, lumber, Christmas trees
4. Return more income to owner.

D. Time to Plant

1. Spring – generally from March 1 to April 30; earlier in Southern Maryland and lower Eastern Shore; later in Northern and Western Maryland. This period of planting begins when the frost leaves the ground and stops when active tree growth begins. Trees are in dormant condition during this time. This is the best period to plant.

Trees planted in the spring can grow, get their roots well established and new growth hardened before the winter weather sets in.

2. Fall – generally from October 1 to November 15. Planting in heavy soils should not be undertaken in the fall. Freezing and thawing pushes or heaves seedling out of the soil, thus exposing roots to the drying effect of the air. Fall planting is suggested in Southern Maryland and the Eastern Shore only.

E. Preparation of Planting Site

None generally needed. Competition from weed growth the first year may reduce survival. It is generally desirable to clear weeds away from the area around each tree, either by mattock or plowing a furrow. If planting on heavy sod, plowing furrows will reduce competition in the furrow where the tree is to be planted. Plowing a season ahead of planting is desirable if the sod is infested with grubs. If furrows are plowed, they should be done 6′ to 8′ apart depending on the spacing to be used. The furrow should be made on the contour to prevent soil wash and retain moisture for the tree in its new surroundings. Generally no fertilizer is needed. Litter, light pieces of limbs, etc. will do more good by adding vegetable materials to the soil.

F. Spacing

The land will grow so many trees and no more. The aim in planting trees is to put the land into full use. Therefore, the spacing of the trees should be close enough to fully utilize the soil and establish good forest conditions. The usual spacing is 6′ x 6′, although 8′ x 8′ is now accepted for some species. Close spacing imitates Mother Nature and is desirable because it forces the trees to grow taller, straighter and, because of competition, causes the side limbs to die and fall off. This makes for cleaner trunks and lumber free of knots, and establishes true forest soil conditions at an early age. Christmas Tree planting may be

4′ x 4′ or 5′ x 5′. Number of trees required per acre for different spacing:

5′ x 5′ – 1742
6′ x 6′ – 1210
7′ x 7′ – 889
8′ x 8′ – 681

G. Planning and Procedure

1. Two general methods of planting now in use are by hand and by machine–

2. Hand Planting [7]

Digging the hole, planting the tree and covering its roots with dirt are all done by hand. This is more practical for the average farmer who only plants a few acres at one time. Furrows may be plowed to facilitate digging the holes for the trees.

3. Machine Planting

Digging the hole and covering the tree roots is done by a machine; placing the tree in the ground is done by the machine operator. Machine planting must be confined to areas free of obstructions, such as stumps, rocks, etc. In such areas, free of obstructions planting costs are reduced greatly.

H. Steps in Planting a Seedling [8]

1. Dig the hole large enough to hold all the tree roots in a natural position. Do not crowd or jam roots together.
2. Fill the hole and cover tree roots with dirt. Do not use leaves, sticks, stones, etc. They cannot be compacted and will permit tree roots to dry out. Survival depends on keeping the roots moist at all times. The tree should be planted as deeply as it grew in the nursery.
3. Tamp soil tightly around tree. As a check, trees should stay in ground if pulled by needles.
4. Generally, planting instructions accompany trees from the nursery. Follow these.

I. How to Plant

1. Have areas examined by a forester to determine best species for the site.
2. Determine spacing and number of trees needed.
3. Order trees suited to the site.
4. Specify when you want trees delivered.
5. Upon receipt of trees, open them and lay seedlings in a long, narrow trench, wide enough to hold them in the shade. This is done so that the roots may be separated and heating injury prevented. This is called "heeling in". The trees may remain here for several days, or a week if it is damp, before planting in the field.
6. When planting time comes fill a bucket half full of thick, muddy water and then put in seedlings.
7. Assemble other tools, generally a mattock and start planting trees.
8. Planting steps are outlined in "H" above.

J. Follow Up Practices

Generally no fertilizing, watering or soil cultivation is needed. If anything, cultivating the land to reduce competition from weeds and other native growth may be helpful for Christmas tree plantings.

K. Survival

On the average, 85% of the trees should live at the end of the first year. Losses higher than this may result from:

1. Seedlings heating in transit or in "heel" bed.
2. Roots drying out during planting.
3. Dry period following planting. Losses in excess of 20% should be made by replanting the following season.

L. Thinning Plantations.

Obviously all trees in a plantation are even aged and generally of the same size. However, because of soil, aspect, slope and inherent characteristics of the trees, some will grow faster than others. If the trees are to grow to timber size, about 200 trees to the acre will be sufficient. Therefore, in thinning select and mark with paint 300 trees which show

promise of being the healthiest and favor them in thinning. All trees which interfere with the crowns of crop trees should be cut. At the end of the rotation, these 300 trees will be narrowed down to 200. When in doubt do not cut the tree; cut only trees which interfere with crop trees. The thinning should proceed gradually as the need arises, always giving preference to the crop trees. The table belows shows roughly the number of trees that can exist in a plantation at various ages of development, assuming tree survival is good.

Age of Plantation	*Approximate No. of Trees Per Acre*
10	1200
20	960
30	860
40	830
50	620
60	470
70	350
80	270
90	220
100	180

The above figures are relative and can vary according to species, site conditions, fire, insects, diseases, etc. The final number of trees per acre will depend on how many the site will support. The fact still remains, select and favor the crop trees, as many as the site will grow.

Ordinarily, in white pine plantations the first thinning will be needed when the stand is 20-25 years of age, and the second one at 45 years of age. This thinning should be rather heavy, giving the remaining trees, all of which have been pruned, the opportunity for rapid diameter growth. Other thinning, while light, may be needed as the crop trees may compete with one another for space in the stand.

M. Pruning

Pruning means the removal of side limbs on the lower tree trunk. Nature does this by having the trees grow closely together, causing the limbs to die and fall off. All future wood growth on such trees will be free of knots and, therefore, worth more. Some trees are poor pruners, such as White Pine. It is desirable at times for man to assist nature

by pruning these trees. This is called "Artificial Pruning". General pruning instructions are:

1. Use saw only
2. Prune limbs up the trunk to a point 18 feet.
3. Saw limbs off next to trunk – do not break bark
4. Prune crop trees only
5. Live tree crown should occupy approximately one-third the length of the total height of the tree. In cutting live limbs, remember the above.
6. Pruning should be followed by the thinning of the crop trees.
   a. Rapid growth, promoted by thinning, will encourage the "healing" over of the cut, made by the removal of the limb.

N. Shrub Borders

One of the benefits of forest lands is the cover and food it affords wildlife. The average hardwood stand, wisely managed, contains trees of all sizes and ages and shrubs of various species. In some stands, a few growing shrubs are shaded out and cease to be of any use to wildlife. This is particularly true when planting pines. Pines, after ten years, form a closed cover over the ground and shade out game food and shelter plants. It is desirable, in many instances, to plant several rows of food-bearing shrubs around the outside of the area. The following should be observed:

1. Consult a game technician or local soil conservation service technician.
2. These shrubs are free to soil conservation co-operators.
3. These shrubs are planted the same as trees.

O. State Forest Nursery

The Department of State Forests and Parks maintains a forest nursery for the production of tree seedlings sold to the public for reforestation purposes. These trees are available to landowners at cost. See Forest Nursery List for examples.[6]

VI. Measurement and Marketing of Farm Woodland Products [9]

A. General

Before a farmer takes farm produce to market, he inventories his produce to know how much he is going to sell and the price he wants for it. He must likewise know the volume and value of timber he plans to sell or cut for his own use.

B. Units of Timber Measurement

1. Board foot – 1 piece of wood 12″ square and 1″ thick
2. Cord
   a. Standard cord – a unit of wood 4′ wide piled 4′ high and 8′ long. The individual sticks are cut 4′ long. Firewood is commonly sold by the cord.
   b. Long cord – unit of wood 4x5x8 feet. The sticks are cut 5′ long. This unit is used in pulpwood sales.
3. Miscellaneous Units
   a. Sizes – Railroad ties, posts, mine props
   b. Lineal foot – poles and pilings
   Weight – copper poles (used in processing copper).

C. Tools Used in Measuring Trees

1. Calipers – a yard stick with two arms, one stationary at zero end of the stick, and the other arm movable. The two arms are placed on opposite sides of the tree at breast height to measure it.
2. Diameter tape. A metal measuring tape, wrapped around a tree trunk at breast height to measure diameter.
3. Cruising stick – similar to a yard stick and graduated to read diameter of tree when held at arms length; same for tree height.

D. Methods Used to Determine Volume of Trees

After diameter and height of the trees have been noted, there are two ways of determining the volume of the trees.

1. Ocular – an estimate at best and only for experienced woodsmen. Sawmill operators commonly use this system. They usually figure conservatively, preparatory to making an offer to purchase the timber.

2. Use of Volume Table

These tables give the volume of a tree for a given diameter and height. Height is usually referred to as merchantable height; that is, the usable length of the tree.

E. Cruising the Farm Woods

1. General

The average Maryland farm woods is 30 - 40 acres in size. A 100% cruise is, therefore, practical; that is, the whole woodlot can be covered in the cruise or inventory. Usually trees under 4″ dbh are not considered.

2. Procedure

a. Measure diameter of each tree

b. Estimate height of each tree in terms of the number of 16′ logs.

c. Record diameter and height on tally sheet by tree species. Some trees are worth more than others. Mark or blaze each tree as it is measured.

d. Determine the volume by applying local volume table to measurements.

e. Deduction for defect (crook, rot, etc.) must be made either by individual trees or by a predetermined percentage of the volume.

F. Measurement of Logs

Logs and other forest products are more readily, and more accurately, measured when on the ground.

1. Log Rules in Use.[11]

a. Doyle – underscales logs under 28″, used by most timber buyers since it favors the buyer.

b. Scribner – Intermediate between Doyle and International Rule and gives fairer reading for seller.

c. International – Most exact.

2. Scale Sticks.

Are similar to yard sticks with volumes shown for various diameters and log lengths.

3. Procedure.

a. Measure diameter inside bark, small end.

b. Measure length of log. Logs usually cut 8′ and longer in even foot length, 3″ usually required over the regular log length to allow for final trimming.

G. Methods of Selling Timber

1. General

Standing timber is generally referred to as stumpage. The three methods used in selling stumpage are:

a. Lump sum for all trees—no restrictions.

b. By the thousand feet—payment made after trees cut.

c. Marked tree method.

Each is discussed in detail below.

2. Lump Sum Sales

In this type sale the timber buyer generally offers a lump sum, say $1,000 for all the timber he desires to cut, generally with no reservations on trees to be left. The buyer is likely to cut everything to get all he can for his money. Small trees are cut which have little value to either the buyer or seller. This is a common method of timber sale. In most cases the owner has no knowledge of the value of his timber and generally sells it at a low figure. In short, this means the timber is undersold and overcut. This type sale generally results in stripping the land.

3. Sale by Thousand Board Feet

In this case, the parties agree on the value of the timber per thousand feet. Then the buyer agrees to pay that rate to the owner for each thousand board feet he cuts. This type of sale is good, provided the timber operator and the land owner can be there to scale the logs. This is time-consuming to the land owner. If he does not check each load as it is cut or sawed, he is at the mercy of the operator for the scale and money returns from the trees. Another disadvantage to this type of sale is the tendency of some operators to cut only the choice logs

out of the tree and allow the poorer grades of logs to lie in the woods and rot. The operator may pay for each thousand board feet of timber cut under this method, but may only take the better logs, leaving the owner with the lower grade logs which are hard to sell to a second operator.

4. Marked Tree Method

This is the most business-like method of selling timber. Under this system the following steps are taken:

a. The salable timber is estimated (measured for diameter and height), and the volume determined. The value is then readily determined, knowing species, quality and accessibility of the timber and current market prices.

b. The trees to be cut are marked, one mark at breast height and one on the stump. The blaze on the stump is used as a check by the owner, after the tree is cut to determine if the tree was marked for cutting in the first place.

As a result, the owner knows which trees he is selling and the operator knows which trees he is buying. Knowing the trees and their volume, it is easy to arrive at a fair price for the timber before it is cut. The owner should receive full or good payment for the timber before the trees are cut. Under this system:

(1) Only the larger mature trees are cut together with some inferior and defective trees, to improve the stand.

(2) The owner gets his money, or a large share of it, before the trees are cut.

(3) The owner gets more for his timber, since he knows its worth.

5. Miscellaneous

Two important matters associated with the sale of timber should be considered here:

a. Good quality timber brings more money per foot. On the 1946 market, a 25" poplar tree, free of limbs on its trunk or bole, may be worth $20/M standing. This same poplar tree with considerable limbs on its trunk, may be worth only $12/M. Generally, larger trees have more clear lumber and are worth more. These figures are for 1946—but the relationship remains the same.

b. Never sell timber until several operators have bid on it. This is likely to result in a higher price to the owner. If the timber is of good quality and readily accessible, the owner can demand a higher price for it and buyers will generally bid against one another to get it. If it is limby, defective, composed of inferior species and inaccessible, a low price can be expected. In this case only a few operators would bid on the timber, and then at low prices.

c. Sales should be made on written contracts only [10]

H. Technique for Cutting Timber

1. Undercut – made by axe or saw, approximately one-third the way through the tree; the under cut should be deeper if the tree leans in the direction it is to fall; not as deep if the lean is away from the direction it is to fall. The undercut is made on the same side or direction the tree is to fall.

2. Felling – Start the sawcut on the opposite side of the tree from the undercut and slightly above the undercut. Use wedges to make sawing easier and to direct fall of tree. Use wedges behind saw after it is buried in the tree.

3. Direction of Fall

a. A straight tree, with an even crown, can be made to fall in any direction with use of wedges.

b. A leaning tree can be made fall one of three ways, with the lean or to either side.

c. Factors to consider in selecting direction of fall:

(1) Shape of the tree top. Fell it where it will do the least damage to other trees.

(2) Prevent its lodging in another tree.

(3) Fell tree where it will not damage in falling.

I. Miscellaneous

1. Tools Needed

a. Double bit axe

b. Crosscut saw and sharpening tools

c. Wedges and sledge hammers

d. Measuring Stick

e. Kerosene, if working in pine.

2. Safety

a. Have solid footing

b. Keep tools sharp and clean

c. Keep others away while working

d. Warn others when tree is about to fall.

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Chesapeake Biological Laboratory

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